

NTK3043N

Power MOSFET

20 V, 285 mA, N-Channel with ESD Protection, SOT-723

Features

- Enables High Density PCB Manufacturing
- 44% Smaller Footprint than SC-89 and 38% Thinner than SC-89
- Low Voltage Drive Makes this Device Ideal for Portable Equipment
- Low Threshold Levels, $V_{GS(TH)} < 1.3$ V
- Low Profile (< 0.5 mm) Allows It to Fit Easily into Extremely Thin Environments such as Portable Electronics
- Operated at Standard Logic Level Gate Drive, Facilitating Future Migration to Lower Levels Using the Same Basic Topology
- These are Pb-Free Devices

Applications

- Interfacing, Switching
- High Speed Switching
- Cellular Phones, PDAs

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		V_{DSS}	20	V	
Gate-to-Source Voltage		V_{GS}	± 10	V	
Continuous Drain Current (Note 1)	Steady State	I_D	$T_A = 25^\circ\text{C}$	255	mA
			$T_A = 85^\circ\text{C}$	185	
	$t \leq 5$ s	$T_A = 25^\circ\text{C}$	285		
Power Dissipation (Note 1)	Steady State	P_D	$T_A = 25^\circ\text{C}$	440	mW
	$t \leq 5$ s			545	
Continuous Drain Current (Note 2)	Steady State	I_D	$T_A = 25^\circ\text{C}$	210	mA
			$T_A = 85^\circ\text{C}$	155	
			$T_A = 25^\circ\text{C}$	P_D	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	400	mA	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode) (Note 2)		I_S	286	mA	
Lead Temperature for Soldering Purposes (1/8" from case for 10 seconds)		T_L	260	$^\circ\text{C}$	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)
2. Surface-mounted on FR4 board using the minimum recommended pad size.

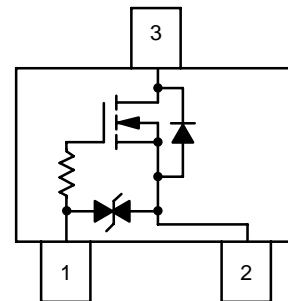


ON Semiconductor®

<http://onsemi.com>

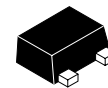
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
20 V	1.5 Ω @ 4.5 V	285 mA
	2.4 Ω @ 2.5 V	
	5.1 Ω @ 1.8 V	
	6.8 Ω @ 1.65 V	

Top View

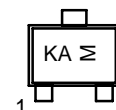


- 1 – Gate
- 2 – Source
- 3 – Drain

MARKING DIAGRAM



SOT-723
CASE 631AA



KA = Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTK3043NT1G	SOT-723*	4000 / Tape & Reel
NTK3043NT5G	SOT-723*	8000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

*These packages are inherently Pb-Free.

NTK3043N

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	280	°C/W
Junction-to-Ambient – $t = 5$ s (Note 3)	$R_{\theta JA}$	228	
Junction-to-Ambient – Steady State Minimum Pad (Note 4)	$R_{\theta JA}$	400	

3. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)
 4. Surface-mounted on FR4 board using the minimum recommended pad size.

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
-----------	----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{GS} = 0$ V, $I_D = 100$ μ A	$V_{(BR)DSS}$	20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$I_D = 100$ μ A, Reference to 25°C	$V_{(BR)DSS}/T_J$		27		mV/°C
Zero Gate Voltage Drain Current	$V_{GS} = 0$ V, $V_{DS} = 16$ V	I_{DSS}	$T_J = 25^\circ\text{C}$		1	μ A
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	$V_{DS} = 0$ V, $V_{GS} = \pm 5$ V	I_{GSS}			1	μ A

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250$ μ A	$V_{GS(TH)}$	0.4		1.3	V
Gate Threshold Temperature Coefficient		$V_{GS(TH)}/T_J$		-2.4		mV/°C
Drain-to-Source On Resistance	$V_{GS} = 4.5$ V, $I_D = 10$ mA	$R_{DS(ON)}$		1.5	3.4	Ω
			$V_{GS} = 4.5$ V, $I_D = 255$ mA	1.6	3.8	
			$V_{GS} = 2.5$ V, $I_D = 1$ mA	2.4	4.5	
			$V_{GS} = 1.8$ V, $I_D = 1$ mA	5.1	10	
			$V_{GS} = 1.65$ V, $I_D = 1$ mA	6.8	15	
Forward Transconductance	$V_{DS} = 5$ V, $I_D = 100$ mA	g_{FS}		0.275		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	$V_{GS} = 0$ V, $f = 1$ MHz, $V_{DS} = 10$ V	C_{ISS}		11		μ F
Output Capacitance		C_{OSS}		8.3		
Reverse Transfer Capacitance		C_{RSS}		2.7		

SWITCHING CHARACTERISTICS, $V_{GS} = 4.5$ V (Note 4)

Turn-On Delay Time	$V_{GS} = 4.5$ V, $V_{DD} = 5$ V, $I_D = 10$ mA, $R_G = 6$ Ω	$t_{d(ON)}$		13		ns
Rise Time		t_r		15		
Turn-Off Delay Time		$t_{d(OFF)}$		94		
Fall Time		t_f		55		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{GS} = 0$ V, $I_S = 286$ mA	$T_J = 25^\circ\text{C}$	V_{SD}		0.83	1.2	V
		$T_J = 125^\circ\text{C}$			0.69		
Reverse Recovery Time	$V_{GS} = 0$ V, $V_{DD} = 20$ V, $dI_{SD}/dt = 100$ A/ μ s, $I_S = 286$ mA	t_{RR}		9.1		ns	
Charge Time		t_a		7.1			
Discharge Time		t_b		2.0			
Reverse Recovery Charge		Q_{RR}		3.7			nC

5. Pulse Test: pulse width ≤ 300 μ s, duty cycle $\leq 2\%$
 6. Switching characteristics are independent of operating junction temperatures

TYPICAL PERFORMANCE CURVES

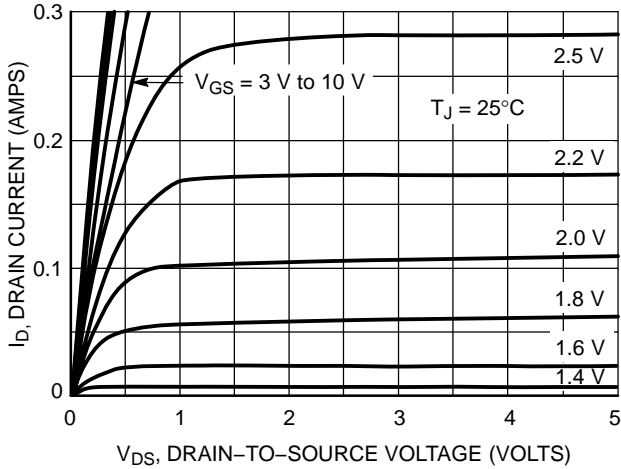


Figure 1. On-Region Characteristics

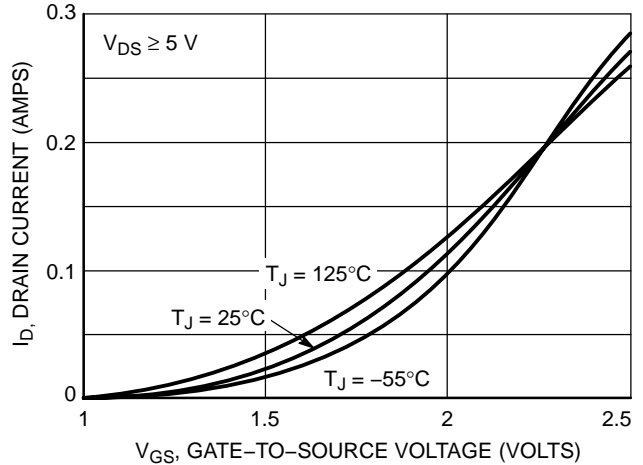


Figure 2. Transfer Characteristics

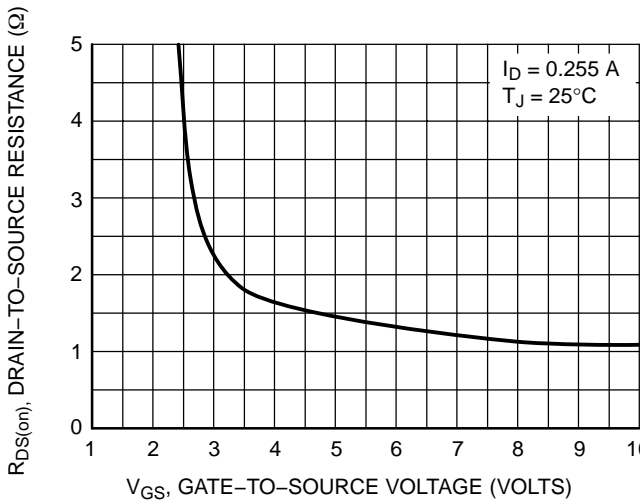


Figure 3. On-Resistance vs. Gate-to-Source Voltage

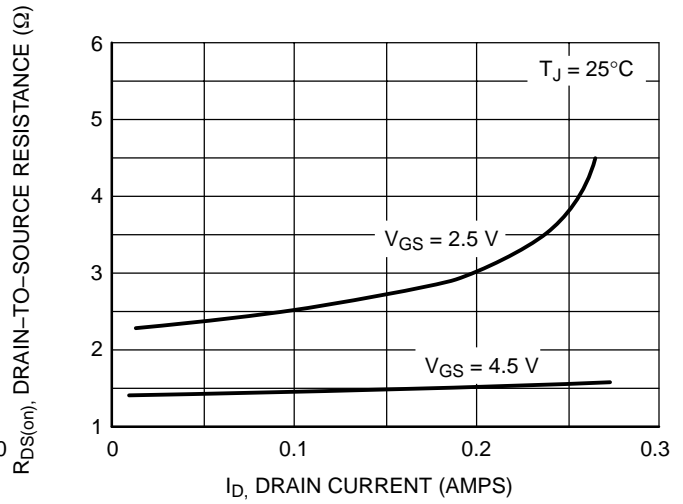


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

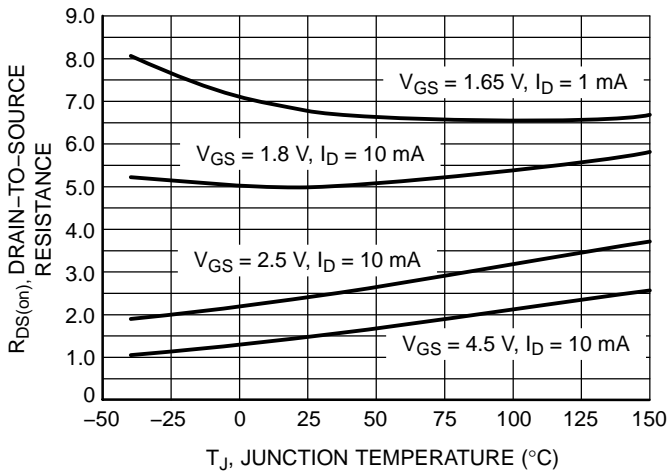


Figure 5. On-Resistance Variation with Temperature

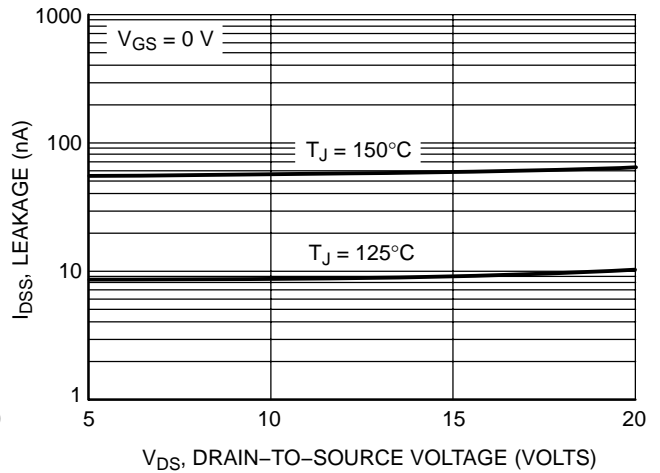


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES

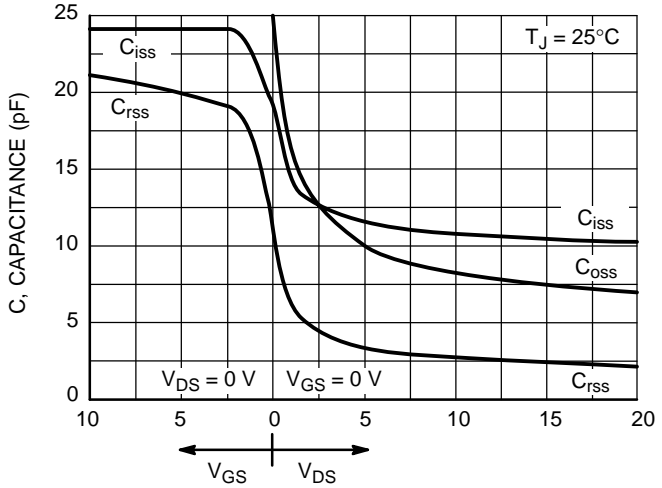


Figure 7. Capacitance Variation

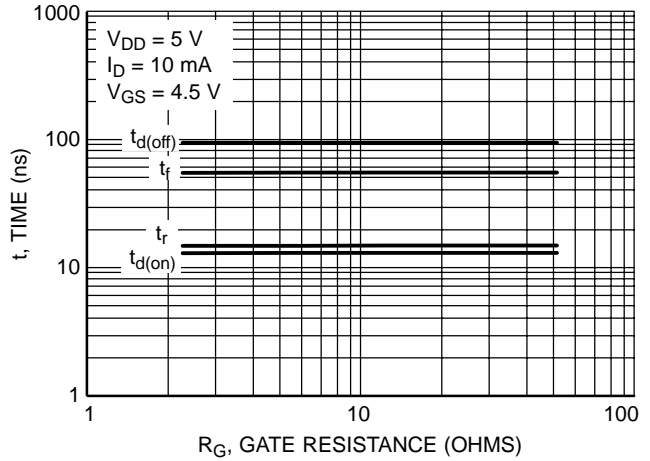


Figure 8. Resistive Switching Time Variation vs. Gate Resistance

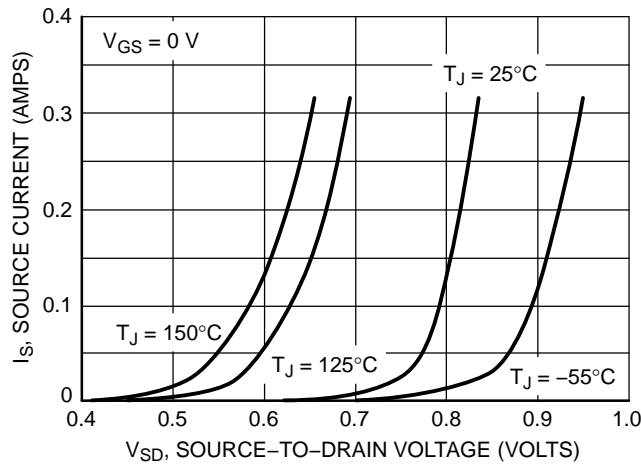
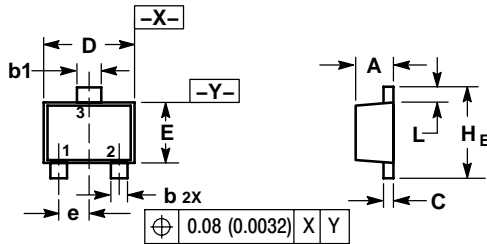


Figure 9. Diode Forward Voltage vs. Current

NTK3043N

PACKAGE DIMENSIONS

SOT-723
CASE 631AA-01
ISSUE B

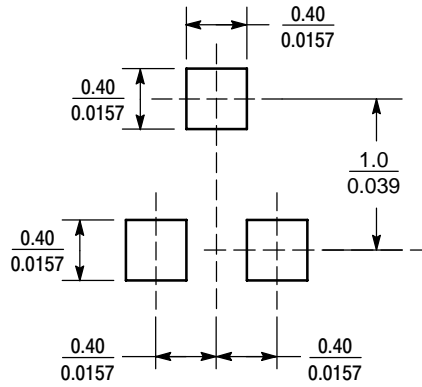


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
b	0.15	0.21	0.27	0.0059	0.0083	0.0106
b1	0.25	0.31	0.37	0.010	0.012	0.015
C	0.07	0.12	0.17	0.0028	0.0047	0.0067
D	1.15	1.20	1.25	0.045	0.047	0.049
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.40 BSC			0.016 BSC		
H E	1.15	1.20	1.25	0.045	0.047	0.049
L	0.15	0.20	0.25	0.0059	0.0079	0.0098

SOLDERING FOOTPRINT*



SCALE 20:1 (mm / inches)

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your local Sales Representative.